CLAIMS

1. Method for the continuous measurement of the thermal conductivity of a multi-functional fluid by which a sample of the multi-functional fluid is passed through a space delimited by a first face, called input, and a second face, called exit, and in which an increase in temperature of the sample of multi-functional fluid is generated, and this temperature increase is measured, characterized by the fact that

- moreover, at least a very brief impulse of heat flux is transmitted to the sample, through the first input face,

- the temperature is measured in at least three separated points within this sample,

- by this measurement, the evolution of the multi-functional fluid temperature is determined at these three points as a function of time,

- as a function of this evolution, the thermodynamic characteristics of the sample of the multi-functional fluid are determined, and

- the thermal conductivity of this sample is calculated.

2. Method according to claim 1, characterized by the fact that the impulses of heat flux are transmitted in a repetitive manner and a thermogram is established consisting of temperature evolution curves as a function of the time between the sending of the impulses of heat flux through the first input face and the evolution of temperature determined at the three separated points within the sample.

3. Method according to claim 1, characterized by the fact that the thermal conductivity is deduced from the following equation:

$$\frac{\partial T}{\partial t}+\alpha(k)\left[\frac{1}{k}\cdot\frac{dk}{dT}\left(\frac{\partial T}{\partial x}\right)^2+\frac{\partial^2 T}{\partial x^2}\right]=0$$

where: T is the temperature

k is the thermal conductivity dependent upon the temperature

t is the time

á is the thermal diffusivity dependant upon k and which is equal to: k(T)/ñ˚Cp

with ñ and Cp being the volume mass and the specific heat.

4. Device for the continuous measurement of the thermal conductivity of a multi-functional fluid, for the application of the method according to claim 1, consisting of means designed to pass a sample of the multi-functional fluid through a space delimited by a first face, called input, and a second face, called exit, of the sample, the means for heating to vary the temperature of this sample, and the means designed to measure the variation of this temperature, characterized by the fact that it is comprised moreover of means designed to transmit to the sample, through the first input face, at least a very brief impulse of heat flux, means designed to measure the heat wave at least three separated points within this sample, means designed to determine on the basis of the values measured the temperature evolution of the multi-functional fluid as a function of time at the separated points within the sample, means designed to deduce from this evolution the thermodynamic characteristics of the sample of the multi-functional fluid and the means designed to calculate the thermal conductivity of this sample.
5. Device according to claim 4, characterized by the fact that the means designed to pass the sample of the multi-functional fluid through the space delimited by the first and second faces includes an enclosure (31) with an insulating lining (32) and an interior coating of polished metal (33), which is continuously traversed by the multi-functional fluid.

6. Device according to claim 4, characterized by the fact that the means (37) designed to transmit to the sample at least one very brief impulse of heat flux is comprised of at least one laser (40).

7. Device according to claim 4, characterized by the fact that the means designed to transmit to the sample at least one very brief impulse of heat flux is comprised of an emitter tube (21).

8. Device according to claim 4, characterized by the fact that the means designed to measure the heat wave which has traversed the sample is comprised of a receiver tube (22).

9. Device according to claim 4, characterized by the fact that the means designed to determine the temperature evolution of the multi-functional fluid as a function of time is comprised of at least three temperature probes (S1, S2, S3) designed to measure the temperature of the sample of the multi-functional fluid at the at least three separated points within the sample.

10. Device according to claim 4, characterized by the fact that the means designed to deduce, from the temperature evolution at the three separated points in the sample of multi-functional fluid, the thermodynamic characteristics of this sample and to calculate its thermal conductivity comprises an arithmetic unit designed to receive from the temperature probes (S1, S2, S3) the signals corresponding to the values measured.